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# *Looking Over Your National Forests*

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UNITED STATES  
DEPARTMENT OF AGRICULTURE  
FOREST SERVICE

## FOREWORD

This booklet has been prepared to meet the need for a brief handbook of information about the national forests of California—where they are located, how they are managed, and what services they provide. It is designed primarily to interpret a resource belonging to all the people and dedicated to serving them. At the same time it attempts to explain, in non-technical language, principles of forest conservation that are commonly accepted. Anyone who wants to learn more about these subjects will profit from reading this booklet.

*Clare Hendee*  
Regional Forester

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# *Looking Over Your National Forests*

By

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## NATIONAL FORESTS OF CALIFORNIA

THE MAP on the opposite page shows the location of the national forests of California. As you see, they are found throughout the important mountain ranges—from the great timber forests of the north to the brush lands of the south. There are 18 national forests,\* and they cover over 19 million acres—nearly 1/5 of the State. In the nation there are 152 national forests, 39 purchase units, 18 experimental forests and ranges, and 8 land-utilization projects, covering 229 million acres.

National forests are managed by the Forest Service of the U. S. Department of Agriculture. The California region is in charge of a Regional Forester. Each national forest is headed by a Forest Supervisor. Forests are divided into from four to seven ranger districts, each with a District Ranger in charge. An Experiment Station, with headquarters at Berkeley, is in charge of a Director who is responsible for research work in the national forests of California.

The national forests were established primarily for timber production and watershed protection. Other legitimate and important uses include grazing of domestic livestock, many forms of recreation, use by game animals, prospecting and fur trapping.

National forests are administered under a policy of "multiple use", in which a variety of activities may be permitted simultaneously. For example, timber cutting, grazing and recreation may occur in an area that also serves as wildlife habitat and as a watershed.

National *forests* are under the Department of Agriculture and are sometimes confused with national *parks*, which are

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\*Excluding Toiyabe, shown on the map, Forest Supervisor's office at Reno; a part of the Intermountain region, headquarters at Ogden, Utah.

under the Department of the Interior. So-called "developmental" uses, such as timber cutting and grazing, are not permitted in the national parks.

National forests belong to the people of the United States and the objective of their management is to serve all the people. The guiding principle of administration was first defined by James Wilson, Secretary of Agriculture, in 1905. He summarized it as "the greatest good of the greatest number in the long run." No user of a national forest obtains a vested right; uses are considered privileges, not "rights", and each use has a limited duration.

The benefits accruing to the American people from safeguarding water supplies and providing recreation are difficult to measure in terms of money. There are, however, cash returns from national forests that are more readily calculated. For example, receipts from sales of timber, from grazing fees, summer-home permits, etc. amount to \$34 million a year in the nation. In 1949 the revenue earned by the national forests exceeded the protection and management appropriation for normal operating expenses by more than \$5 million. More and more, national forests are paying their way.

Of the cash earned by national forests, 25 percent is returned to the states for distribution to counties in which there is national-forest land. Counties must expend the money on roads and schools; in this way counties in California received \$972,650 in 1951. In addition, ten percent of national-forest earnings are returned to the Forest Service for expenditure on roads and trails in California; this amounted to \$389,060 in 1951. So you see, although national forests are exempt from taxes, 35 percent of the money they earn comes back to California in lieu of taxes in the manner described.

## NATIONAL FORESTS PROVIDE TIMBER

A LITTLE over half of the timber-forest land in California is privately owned, and nearly half is in national forests. Although national forests at present furnish only about 14 percent of the annual cut of timber in California, the demand is increasing as the more accessible private timber is cut over. The coming importance of government timber can be judged from the fact that some 70 percent of private pine timber land has been cut over, and 35 percent of the private redwood, while only 17 percent of the acreage of national-forest timber has been cut over. National forests, however, can not fully take the place of private land as a future source of timber, as we shall see later.



Selected trees are marked for cutting in national-forest timber sales.

Many local communities in the rural areas of California are dependent upon national-forest timber for their prosperity. Logging and milling provide an income for approximately 30,000 workers; many more are engaged in the servicing of wood and putting it into use. Possibly 400,000 persons in California are dependent upon wood in one way or another for their livelihood. Lack of foresight in providing for a continuous supply of timber can result in loss of income and jobs to the people living in dependent forest communities.

The drain on timber in California is about  $3\frac{1}{2}$  times the growth. Drain includes cutting, and losses from fire, insects and disease. Four important steps are necessary if this situation is to be corrected without reducing production: (1) Spread the total cut from private lands over more acres, lightening it where "too-much-per-acre" is being removed. (2) In order to make available the larger area required for a lighter cut, construct access roads into old-growth stands. Government aid should be provided to build such roads. The national forests of California could safely yield almost twice the present harvest of timber products if the necessary access roads were constructed. (3) In cutting, remove old trees and those attacked, or likely to be attacked, by insects and disease. Leave as many thrifty trees as possible; their growth will be accelerated when additional sunlight and moisture are made available. These measures, along with very intensive treatment, will tend to increase the annual growth to a point where it is more nearly in balance with drain. (4) After stagnant old-growth stands are converted by cutting to *managed* stands, in future cuts remove no more timber than is being grown. This is called *sustained-yield* cutting; it is the basis upon which the national forests and a few private operations are managed.



The forest you see in this picture has been lightly cut for saw timber. It appears untouched, however, because care was exercised in selecting and removing the timber. Stands of virgin timber are unhealthy because they include trees that are disease-ridden, old trees which have stopped growing, and weakened trees likely to be attacked by insects. The only practical way in which a virgin forest can be made healthy is through logging, in order to remove the type of trees mentioned. The remaining trees immediately begin to grow faster; the net rate of growth may increase from two to five times.

Nearly all the land cut over in the past is privately-owned, and  $\frac{3}{5}$  of the remaining volume is privately-owned. Stability of production at a high level is therefore largely a question of the productivity of private land: How much timber will be grown on private land previously cut over, and how much can be grown on private land yet to be cut over? National-forest timber can only bridge the gap between the diminishing of

present supplies and the maturity of a new private-land crop. Will it be a full crop and of desirable species? That is the critical question.

What the operator does to land determines whether it will produce valuable timber or weed-tree species and brush. Operators on private land practice a variety of cutting methods with a corresponding diversity of attention to future crops. Certain progressive companies, and they are usually the larger operators, practice good cutting methods. On the other hand, most opera-



This farm forest should be thinned out to increase the growth rate of remaining trees. The material from the thinnings has a cash value.

tors do not leave the land in good producing condition. The State Forest Practice Act of 1945 and the Tree Farm movement are industry-sponsored, voluntary programs for private lands. They indicate that the industry recognizes the need for better cutting practices. As these programs become stronger and set higher standards, they will become increasingly effective forces for proper harvesting methods.

Obtaining good forestry on private lands is complicated by the fact that 99 percent of all timber owners are small owners, with average holdings of only 219 acres each. Yet together they own 48 percent of all private timber acreage. It will take a greatly expanded effort to reach hundreds of small owners with the message of forestry and on-the-ground help and advice.

The Forest Service has been assigned the job of conducting a survey of the nation's timber supplies, growth, and needs. As a result of preliminary findings, the federal aspects of a long-range forest program have been clarified in recommendations that involve a large measure of State and private cooperation. Strengthening of State forestry agencies is an important part of the federal program. The aim is to help private owners take care of their own lands; but they cannot be expected to do alone a job for which they are as yet unprepared and unequipped. The Forest Service believes a long-range program should include these objectives for action:

1. A series of public aids. Some of these aids require new legislation, others are in effect but need strengthening. The aids would include such steps as providing technical assistance in establishing and growing forests and in harvesting, marketing and processing forest products.

2. Educational and demonstration work should be strengthened.

3. Forest planting on private land should be greatly accelerated.

4. Federally-sponsored credit and insurance systems should be established.

5. Forest cooperatives, similar to farm cooperatives, should be encouraged.

6. Forest-tax laws should be improved so as to make holding of timber for successive harvests economically more desirable for private owners and liquidation less attractive.

7. Cooperative protection against fire, insects and diseases

should be extended and intensified on all forest lands regardless of ownership.

8. All phases of forest research should be extended.

9. The national-forest ownership pattern should be consolidated by adding badly-depleted land not feasible for restoration to productive condition by private owners. Key areas which communities feel are necessary for watershed protection and other purposes, should also be brought under public ownership.

10. Means should be provided for more intensive management of national forests.

Such a program represents a widespread attack on the problem of making the nation's timber resources contribute their full potential to a prosperous economy. It is a program that calls for the best thought and effort of citizens everywhere and by land owners and public and private forest agencies alike if it is to be realized.

## NATIONAL FORESTS FURNISH GRAZING

IN THE MEADOWS and openings in the forest grow grasses, weeds and low shrubs that furnish feed for livestock and big-game animals. Grazing these plants harvests a forage crop that would be otherwise unused, and properly managed, causes no damage either to soil or to plants.

The national forests of California provide grazing for approximately 115,000 cattle, 100,000 sheep and 3,000 horses and goats during the summer season as a supplement to ranch operations during the remainder of the year. Nearly 1,800 livestock owners are granted permits to graze.

Permits extend certain privileges of grazing use, subject to administrative control, in a manner similar to timber cutting, recreation, or any other use. Permits are in no sense permanent



Although grazed for many years, the grass in this meadow is in good condition because of proper use.

"rights", since they are subject to adjustment when needed to protect the range. The reasons for not "guaranteeing" grazing for a fixed number of livestock are obvious: The forage resource is limited, the same as any other resource; it can be overutilized and damage can result. Administrative control must be directed toward safeguarding the public's interest. In recent years "advisory boards" of local persons representing other interests, as well as grazing, have been called upon for counsel in arriving at decisions involving range use.

Although producing but a small percentage of the nation's total of livestock products, national forests are an important segment of the local economy. Most of the permit-holding ranchers are in a large measure dependent upon national-forest range for successful operation. Grazing in the summer on the higher ranges not only provides much-needed pasture at a season when grass is short, but usually means better weight-gains on livestock because of cooler climatic conditions, more favorable watering places, and greener grass than can be found in the hot, dry valleys and foothills. National-forest grazing privileges are therefore much sought after and the demand for permits usually far exceeds the range available.

Much of the mountain range is steep, the soil is thin, and the biological balance may be easily upset, resulting in overgrazing in localized spots, loss of topsoil by erosion, or deterioration in the character of the species present. Proper use of the range is therefore essential if damage is to be prevented. To maintain soil and plants at a high level of productivity, certain rules should be followed:

1. Allow livestock on the range in the spring when the plants are properly developed—not before.
2. Allow proper numbers of livestock—not too many.
3. Keep livestock scattered in order to obtain even use of the range.
4. Leave at least one-third of the forage uneaten each year

- for seed and for storage of reserve food in the roots.
5. Don't burn the range unless a technical advisor recommends it, and obtain a permit before attempting it.



Improper use of range causes deterioration of soil and vegetation. This usually results in erosion.

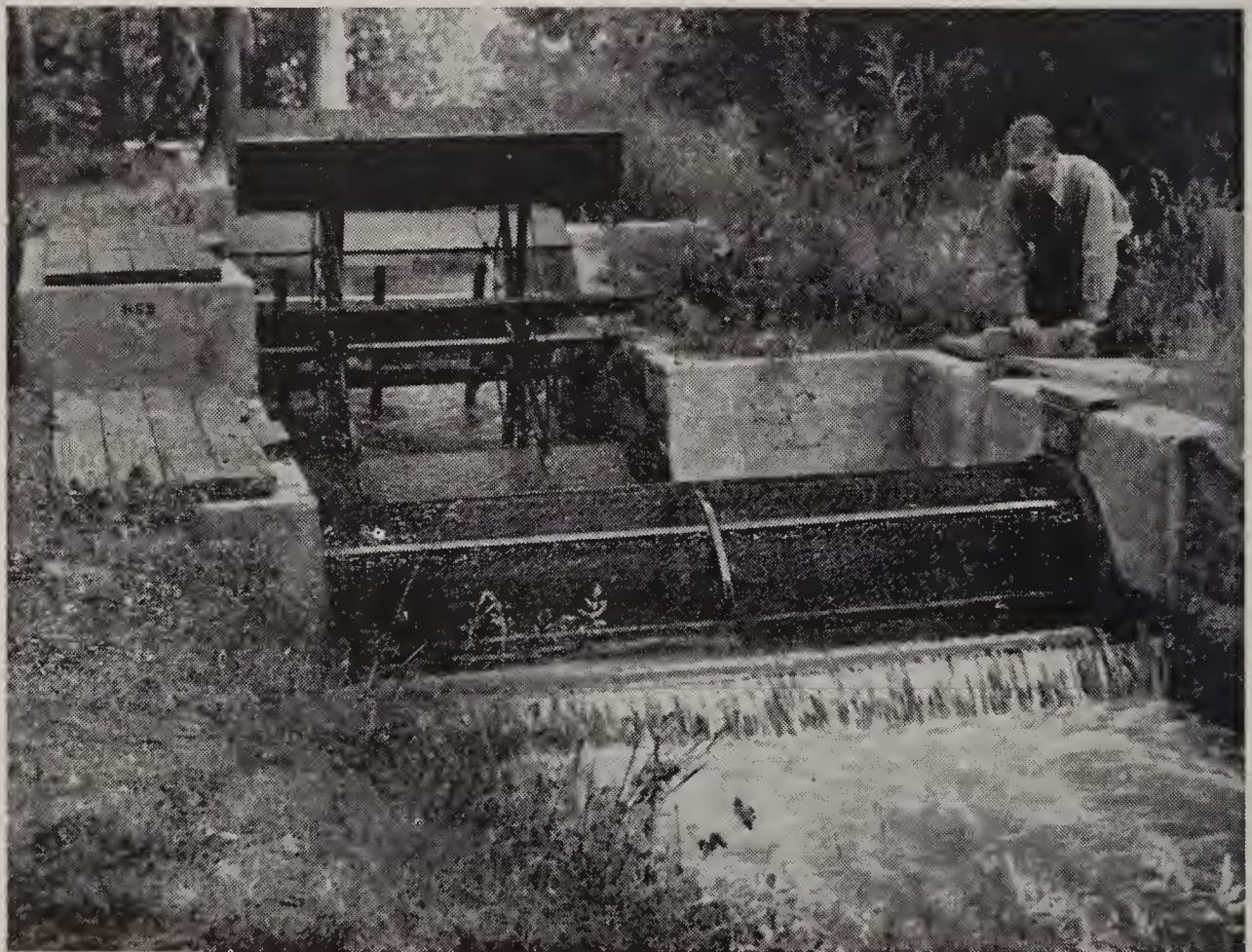
Different methods of rehabilitating depleted ranges are being tried:

(1) Better management. (2) Proper numbers and proper seasons. (3) Reseeding, where native vegetation is insufficient to provide a good seed source. The first step in reseedling is usually to harrow the ground, after which grass seed is drilled, (4) Where good native plants are present, although depleted, they may be released by killing the inferior plants so that the desirable species may spread. Selective chemical sprays have been successfully used, for example, to kill sagebrush, releasing the intermixed grass, unharmed by the chemical, so that it may reestablish itself. (5) Transmitting water through ditches or pipes and spreading it over portions of the range to encourage growth of feed.

## NATIONAL FORESTS PROVIDE A WILDLIFE HABITAT

COMMERCIALLY, hunting and fishing are "big business" in California, in connection with which an estimated 250 million dollars are spent each year. To other vacationists, quieter but no less attractive recreation is afforded by the opportunity to see, study, and photograph wildlife in its natural environment. Yes, wildlife—fish, wild animals and birds—add much to the enjoyment of our living.

National forests provide the home, or habitat, for large numbers of wildlife. Two-thirds of all the deer in California live for most of the year in the national forests. National forests also include most of the trout waters, much of the fur-bearers' territory and parts of the quail range.



This screen prevents trout in a stream from entering an irrigation ditch.  
The waterwheel revolves the screen, which cleans itself.

The responsibility for managing wildlife on national-forest land (as on any land regardless of ownership) lies principally with the California Division of Fish and Game. The Forest Service cooperates with the Division in surveys to determine the size of animal populations, the ratio between the sexes, the extent to which forage is used, etc., and assists in fish-stocking and in enforcing the fish and game laws.

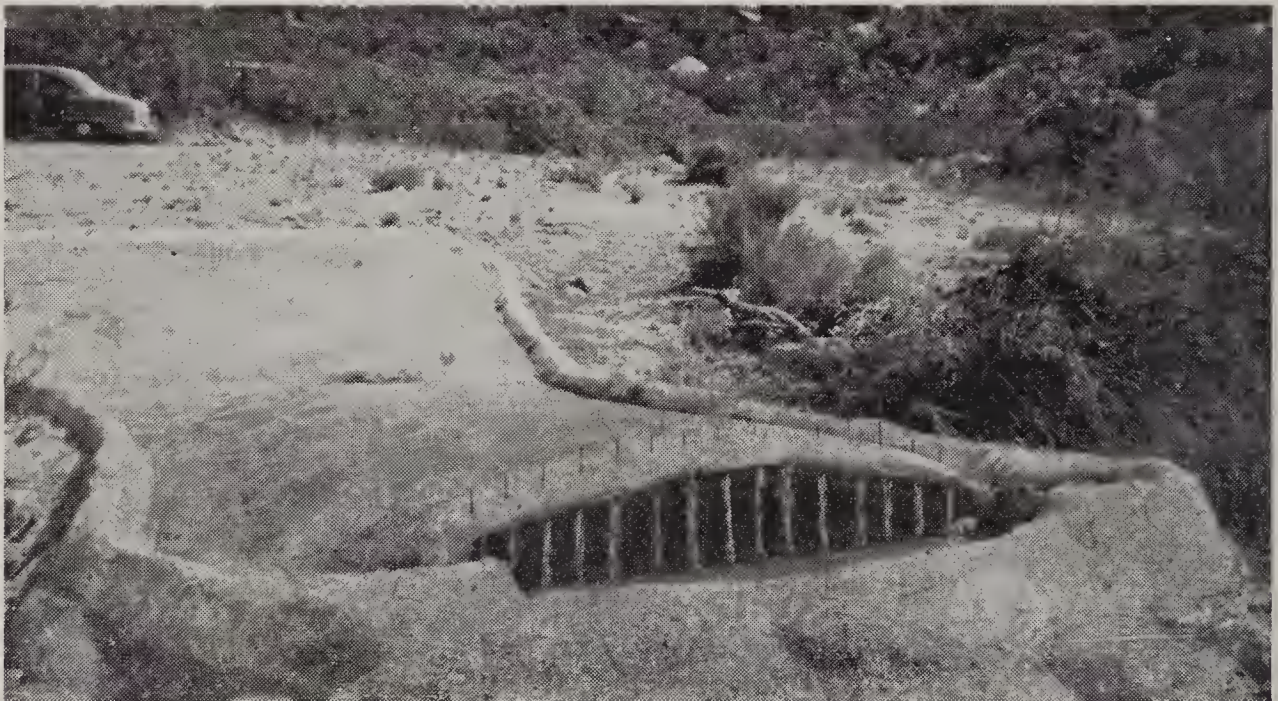
The principal job of the Forest Ranger in connection with wildlife, however, is none of these, but to provide favorable conditions of habitat in his district, so that wildlife may have the best possible environment for living. Management of vegetation and water in the growing and harvesting of timber, for example, and in the grazing of livestock on critical or key areas is carried out so as to be of benefit to game. In managing water, the Forest Service issues permits with provisions that require screens, ladders and by-passes for the protection of fish. Improvements designed to benefit wildlife are installed, such as watering places, and small dams at lake outlets to maintain flow-levels downstream. Reseeding of ranges to provide additional forage for domestic livestock usually benefits deer also by relieving pressure on the natural vegetation they use as forage.

It is economically impractical to satisfy every sportsman by attempting to replenish wildlife through factory-line propagation methods. As soon as there is an increase, fishing and hunting pressure also increases. There is obviously a limit also to the size of wildlife population that any particular area can support. Wise management of the land will, however, do much to increase populations when they are below the optimum. Habitat improvement is a natural method; it is therefore sound, and brings about lasting benefits.

In some parts of California, particularly in the Northeastern section, severe dislocations have arisen in the natural balance between food supply and deer population. Deer may be allowed to increase to the point where there is insufficient feed on their winter range to support the herd. Then disease and starvation

take their toll, reducing the population in nature's own ruthless way.

The cycle is perpetuated because overgrazing by big game kills vegetation and exposes soil to trampling and packing; this reduces the capacity of the soil to absorb water, and sets the stage for erosion. Soil and plants may be damaged so severely by overgrazing that many years under lighter use, perhaps hundreds of years, may be necessary for recovery of vegetation and restoration of fertility. Summer range, at the higher elevations, is usually adequate for big game; it is winter range in the foothills that is likely to become damaged.



This structure provides water for quail and other birds and small animals. In the rainy season, water is caught on the pavement in the left background, and runs into the reservoir underground where it is stored for the dry season. A ramp leads down to the water level. Bars keep out the larger animals.

In cases of over-population, the only logical solution seems to be a hunting season designed to reduce the breeding stock—the does. This management device sometimes meets opposition, even though starvation and disease may be the alternatives, because some people have a strong emotional attachment for does. At such times, the clear thinking of conservationists is needed in seeing the causes and effects and in helping to promote understanding of the situation. Open season on does is only declared after thorough study and analyses by technicians followed by public discussions held locally.

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### **NATONAL FORESTS PROVIDE RECREATION**

MORE PEOPLE are probably served by the recreational benefits of forests than by any other type of use except the supplying of water. Some 13 million persons drive cars through the national forests of California each year, and about 4 million of them stop to enjoy fishing, hunting, camping or skiing.

There is no fee charged for entering national forests, and, except for a small charge at some of the larger campgrounds, camping privileges are free.

The national forests of California are yours to enjoy. In them are more than 1100 campgrounds with facilities for camping and picnicking. Camps for boys and girls, municipal camps, summer homes, pack stations, and resorts are permitted in specially-planned areas. A small annual rental charge is made for summer homes and commercial enterprises.

For lovers of nature in the raw, 18 Wilderness Areas have been set aside for the preservation of primitive conditions. Within these Areas, on some 1½ million acres, no development is permitted except the trails necessary for administration and fire protection.

Visitors sometimes call attention to garish advertising and low-standard dwellings they see within national-forest boundaries. Usually investigation shows that the objectional features are not located on national-forest land at all because there is a great deal of private land within the boundaries of national forests over which the Forest Service has no jurisdiction. The danger of creating unattractive surroundings is recognized in all permits granted for structures on national-forest land by inserting clauses that stipulate requirements for appearance, sanitation, and fire protection. Rustic design and quiet colors are encour-

aged. Surveys, plans, and designing are all part of the management of recreation in national forests today.

Occasionally visitors observe overcrowded conditions, particularly on holidays and week-ends, lapses in removal of garbage, etc., and wonder why the "Ranger isn't on the job." Unfortunately, facilities are obviously inadequate in many cases, and personnel for proper housekeeping woefully short. The choices in meeting this situation seem to be either to curtail use, to make the best of overcrowded conditions as they are, or to obtain the appropriation of adequate funds for correcting deficiencies in accommodations and manpower.



As population increases and as the wilderness frontier is pushed farther back, pressures inevitably develop to open up and "civilize" new areas of unspoiled country. Such questions as these arise:

Shall roads be extended into the hinterland?

Shall commercialization be permitted, and if so, how much and of what kind?

Shall four-wheel-drive vehicles be permitted to travel cross-country? (They are often the agents for starting erosion by causing ruts).

Who may utilize the forage in key meadows where tourist use is heavy—the occasional small party with their own saddle- and pack-stock, the guided “dude” party, or permitted cattle or sheep?

Shall airplanes be permitted to land in Wilderness Areas?  
On public land? On private land within the Area?

May motors be used to power boats on “wild” lakes?

Such questions are not always easily answered. Yet they must be resolved by clear thinking for “the greatest good.” We all know that “pressure” by itself never permanently solves a problem of land use, although it may temporarily “settle” it. Conservationists must particularly strive for fair and wise answers in recreation management, where the course is not always as well charted as it is in other fields.



## 6

### NATIONAL FORESTS ARE WATERSHEDS

FORESTS have five important effects on water supplies: (1) They lessen the amount of damage that may be caused by floods. (2) They reduce the amount of silt that may be carried into reservoirs as a result of disturbances upstream. (3) They increase the percentage of *usable* water that is yielded from a watershed. (4) They help prevent erosion by binding the rich topsoil with roots, thus maintaining soil fertility. (5) They help regulate streams by reducing the peak-flow and carrying it over into periods of low-flow.



Rangers measure the snow pack. They push a metal tube through the snow and snow fills the tube. The weight tells them how much water is present.

Most of the high-mountain area of California is covered by national forests. Here a great "snow-pack" is accumulated; forest trees cast shade which slows down the rate of melting and is responsible for a "delayed-action" effect in the spring, causing streams to maintain flow later into the dry summer.

About half of the annual runoff from California's watersheds comes from the national forests. National forests furnish much of the water for domestic supplies, and are the "backbone" of the irrigation supply, particularly in the Central Valley. Some of southern California's water comes from the Colorado River, the headwaters of which lie in the national forests of Colorado, Wyoming and Utah, hundreds of miles away. Water-power projects in California obtain 92 percent of their water from national forests. Other benefits arise from the fact that water in national-forest lakes and streams is clean and provides fishing, swimming, boating and scenic beauty for the enjoyment of thousands of people.

Forested watersheds have the ability to take up water from rain or snow-melt, allowing it to percolate slowly through the ground instead of running off quickly from the surface, aggravating flood conditions and transporting silt. The early winter floods of 1950 brought home to thousands of people in the lower Sacramento and San Joaquin Valleys the tremendous damage that uncontrolled water can do. In storms such as those that brought about this disaster, heavy fall of rain and melting of snow combined to release a quantity of water far beyond the storage capacity of the watersheds. Forests are unable to prevent such floods, although they reduce the ultimate damage.

Surveys made immediately after the 1950 storms showed conclusively that areas burned within the previous three years contributed much more runoff and debris to the flood flows than adjacent unburned areas.

In southern California, the benefits of vegetative cover in anchoring soil and in reducing siltation in reservoirs are some-



Silt and debris to a depth of from three to five feet was deposited in this California orchard by a stream in flood.

times even more important contributions than the relieving of flood damage.

To obtain maximum benefits from watersheds, vegetative cover and soil must be managed so as to stabilize soil in place, and to maintain high infiltration capacity and high water-holding capacity of the soil. Watersheds do not necessarily have to be closed to all forms of use in order to safeguard them, but use should be conservative and intelligently conceived. Logging may be permitted without serious damage to watersheds; studies have indicated, for example, that if a forest is dense, water yield may be actually increased by cutting since more snow is permitted to reach the ground when the stand is opened up. Overgrazing by livestock or big game may create problems of erosion and silting, but conservative grazing ordinarily has no injurious effects. Recreation use must be carefully regulated in watersheds

to prevent widespread packing of soil, to control smoking and camp fires, and to maintain sanitary conditions.

Today, although watersheds are receiving increased attention, the degree of management falls short; in many cases "protection" would be a more appropriate descriptive term for their treatment than "management". Intensive management of watersheds requires such measures as gully-plugging, reforestation and reseeding, stepped-up protection, and higher standards of road construction. A change from the minimum standards of present-day treatment must await a day when the values at stake are considered to be worth the sums that must be expended to preserve them.

## 7

### ENEMIES OF THE FOREST

IN SOME WAYS, attacks on the forest are more serious than attacks upon agricultural crops: The terrain is more difficult for one thing, and mass control methods are not feasible for another—the forest crop is made up of a number of species and is attacked by a variety of enemies making protection and control a complex matter; and of course the loss of a forest crop may take a hundred years—or a thousand—for replacement where the loss of a farm crop may take but one.



Excessively heavy logging is often followed by fire. Large areas are then left without adequate seed sources and brush instead of trees covers the ground for many years.

The principal enemies of the forest are fire, insects and disease. Sometimes considerable damage may also result from

overgrazing by livestock or big game; from wind, snow, or sleet; and from girdling by porcupines and rabbits. Perhaps for 8 out of 10 fires in California, chiefly because he does not "Man" should be included as an enemy too; he is responsible put out his smokes and carelessly burns debris.

In 1950, the national forests of California experienced their worst fire year since 1924. Area burned mounted to 225,000 acres, four times the average for the preceding five years.

The only way man-caused fires can be prevented is through educating the people who use the outdoors. Here is a conservation job of the highest importance at which everyone can lend a hand. The fire-prevention rules are simple; they can be learned, practiced, and demonstrated for the benefit of others:

1. Crush out your "smokes". Use ashtrays in cars.
2. Break your match in two.
3. Drown your campfire; then stir and drown it again.
4. Get permission to burn debris, and do it safely.

Everyone loses when the forest burns. Fires destroy valuable timber, disfigure the landscape and encourage invasion of brush at the expense of timber. Fertility of the soil is always less after a fire. If steep hillsides are burned, they will probably become eroded, and if reservoirs are below, silt will be deposited in them. Wildlife is killed in fires and their habitat destroyed. It may require several hundred years for vegetation to develop naturally to a stage where it is again as stable as it was before the fire. Or it may require a thousand years. At the worst, perhaps a good forest may never again cover the ground unless it is replanted.

Present planting costs run from \$35 to \$50 an acre, and very little is being done. There are about 1½ million acres of land in California upon which fine timber once grew, but which now lie idle and unproductive as a result of destructive logging followed by fire. Yet there is only one forest-tree nursery in the State—the Mount Shasta Nursery of the Forest Service near

McCloud—and it can supply barely enough stock each year to reforest the acreage burned in the national forests. Private-land planting is practically at a standstill.

One way to avoid adding more and more to the already large bill for replanting which will some day inevitably fall due, is to keep fire out of our watersheds today. People must be informed of the toll that fire takes, and learn the specific acts of carelessness that cause fires.

Insects have destroyed more timber in California's forests than has been cut for lumber. The most dangerous are the bark beetles in the ponderosa pine stands. Control consists in felling infested trees, peeling them, and burning trunk and bark to kill the broods. Chemical sprays are also used. Selection of insect-susceptible trees for logging, as determined from external characteristics, is an effective method of preventing epidemics and of salvaging timber before it is attacked. In the pine region,



—Photo by U. S. Bureau Entomology & Plant Quarantine

Western pine beetles killed this forest.

insect-susceptibility is the principal basis for marking trees to be cut, in the national forests as well as in those private operations where selection-cutting is practiced.

One of the most serious of the tree diseases is blister rust, which attacks sugar pine. The disease lives for part of its life on currant and gooseberry bushes. Control consists of eradicating the bushes to disrupt the life cycle. However, such common diseases as heart-rot kill more timber each year than blister rust. Diseases of this sort are widespread and there is no practical method of control. Until forests come under more intensive management there is little likelihood that any except the most virulent and most controllable types of insect or disease threats will be combatted. As with the small fire, losses will continue to be unspectacular but persistent.

The whole protection picture has a strong relationship to economics: With the funds available, how much preventive or control work can be done to fight fire, insects and disease, in what kinds of forest, and in what locations?

## NEW KNOWLEDGE IN FORESTRY

TO ARRIVE at the facts upon which sound technical management of forests and ranges can be based, continuous research is necessary. It might seem like a simple thing, for example, to select species of grass seed for sowing along with mustard after watershed fires in southern California. Yet study plots had to be established on the burns and 17 different species of grass tried out in order to find the few that appeared to have a good chance of survival. This is but one example of the practical application of research.

The Forest Service maintains a total of 11 experiment stations, one of which is the California Forest and Range Experiment Station, with headquarters in Berkeley. Field branches of the Station are maintained at seven locations, three of which are in the northern Sierra-Cascade area, three in the central Sierra, and one in Los Angeles County. The Experiment Station conducts studies in such fields as forest management, utilization, genetics and economics, range problems, flood control, influences (runoff and erosion studies); and behavior, methods of control and effects of fire.

The Forest Products Laboratory at Madison, Wisconsin, has become the outstanding institution of the world for the scientific study of wood and its uses. Here in a "House of Magic" studies are carried forward in seasoning of wood; glues and gluing; preservatives and protection of wood; container materials, constructions, and testing; wood chemistry and chemical conversion; pulp and paper; and wood strength and structure.

Better salvage of material now unused in woods and mill depends in part upon having processing plants and developed markets. Two new plants have recently been completed in

California which will handle chips instead of logs. Other processing plants are needed. Heavy initial investment costs have undoubtedly discouraged plant construction thus far. Here is a business that will some day provide an attractive profit for operators and a variety of new and useful products for consumers.

As yet California has no regional laboratory for studying utilization, but funds have been allocated by the State for construction at Berkeley. When completed, the laboratory will help solve the problem of salvaging material now wasted. Logging produces a great deal of residue in the form of cull logs, large branches, tops and defective butts. Milling produces sawdust, slabs, and trimmings. In the pine region about 50 percent of the tree appears in the final product, and in the redwood region about 40 percent. All of the remainder is not necessarily "wasted"; it may be used in several ways. Slabs, trimmings and sawdust, for example, may be salvaged as fuel for the mill boilers. However, most mills are able to use but a small part of their residue in this way. Some of it may be sold as fuel wood or made into lath; or it may be used as fuel in steam plants to generate electric power, or used to heat a town. As a rule, the amount of material salvaged is proportional to the size of the operation.

UTILIZATION OF THE TREE



IN THE PINE REGION



IN THE REDWOOD REGION

## "HOW CAN WE HELP?"

CONSERVATION, to be effective, must be translated into action. The person who is "working on the land" is the one more than any other who determines whether conservation is really practiced. But most of us have a limited opportunity to practice conservation; we are not farmers or lumbermen; we do not own or have control of significant acreages of land. Like many persons, you may have wondered what you can do to help. Fortunately, there are jobs that all of us can do—jobs that may lead, however indirectly, to on-the-ground practice of conservation. Here are some of them:

1. You probably belong to a group—social, fraternal, civic, professional. See that your group has a conservation chairman and devotes at least one meeting a year to conservation. One of the most effective things you can do is see that people with whom you are in contact are informed about the facts of conservation.
2. Sponsor showings of motion pictures. Send for Forest Service list describing 26 color-sound, 16mm movies. No charge except return mailing which averages about 20 cents per picture. Just ask for *Motion Picture List*.
3. Study and report on Federal and State legislation which affects the protection and wise use of natural resources.
4. Sponsor introduction of forest-conservation materials in schools. Upon request the Forest Service leaflet *Educational Materials* will be sent to you or to any teachers you select. It describes audio-visual materials prepared especially for California use, including sets of study-prints, color slides, and adventures on records, as well as printed material.
5. Sponsor poster, essay, and slogan contests in schools.

6. Arrange for distributing free fire-prevention material.
7. Sponsor a Penny Pines Plantation, or spearhead such a program in youth organizations, schools, etc. A contribution of \$68 or more sent to the Forest Service will be used to plant at least 10 acres of burned area in a national forest. A sign will be erected bearing the name of your group. Send for "Penny Pines" literature describing this project.
8. There are 18 Forest Supervisors and nearly 100 Rangers in California. One of them may be near you. Arrange with any of these officers for a field trip to see national-forest activities. Addresses of Supervisors are shown on the map facing page one. Feel free to write them.



For further information, or any of the material mentioned, address:

Division of Information and Education,  
U. S. Forest Service, 630 Sansome Street,  
San Francisco 11, Calif.





